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**United States Patent** [19]

Gould et al.

[11] **Patent Number:** **5,120,816**[45] **Date of Patent:** **Jun. 9, 1992**[54] **HYDROPHILIC POLYURETHANES OF IMPROVED STRENGTH**[75] Inventors: **Francis E. Gould**, Princeton;  
**Christian W. Johnston**, Neschanic  
Station, both of N.J.[73] Assignee: **Tyndale Plains-Hunter Ltd.**,  
Princeton, N.J.[21] Appl. No.: **561,240**[22] Filed: **Jul. 24, 1990****Related U.S. Application Data**

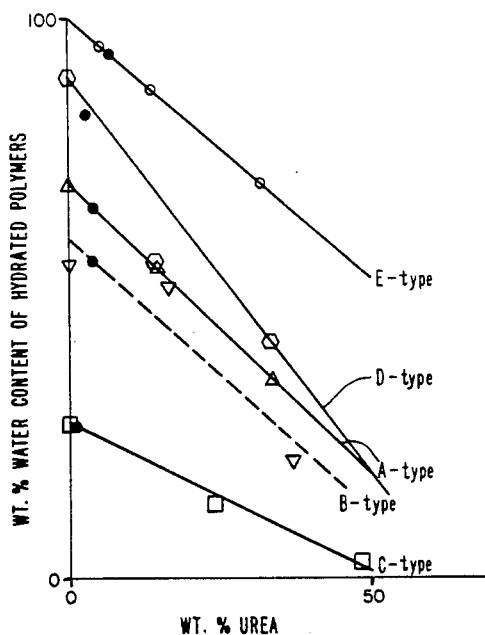
[63] Continuation of Ser. No. 127,794, Dec. 2, 1987, abandoned.

[51] Int. Cl.<sup>5</sup> ..... **C08G 18/30; A61F 2/14;**  
A61F 13/15[52] U.S. Cl. .... **528/76; 521/176;**  
525/460; 604/372; 604/228; 623/5; 623/7;  
623/12; 623/9; 623/2; 606/231[58] Field of Search ..... 521/176; 528/76;  
525/460; 424/78[56] **References Cited****U.S. PATENT DOCUMENTS**2,977,330 3/1961 Brown et al. .... 525/454  
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4,496,535 1/1985 Gould et al. .... 424/19  
4,789,720 12/1988 Teffenhart ..... 528/76*Primary Examiner*—Thurman K. Page*Assistant Examiner*—Peter F. Kulkosky*Attorney, Agent, or Firm*—Ratner & Prestia[57] **ABSTRACT**

The strength and integrity of hydrophilic polyurethane resins prepared by reacting a diol component, an organic chain extender and an organic diisocyanate are improved by critical selection of the diol component, the amount of water in the reaction mixture and the mole ratios of the reactants. The diol component is at least one of (1) a long chain poly(oxyethylene) glycol of molecular weight above 2500 and (2) a medium chain poly(oxyethylene) glycol or polyester glycol of 250–2500 molecular weight. The chain extender is a difunctional compound having a molecular weight of less than 250. The amount of water in the reaction mixture is 0.5 to 2.5 weight % and the urea content of the resins is from about 13.6 to 33.7 weight %.

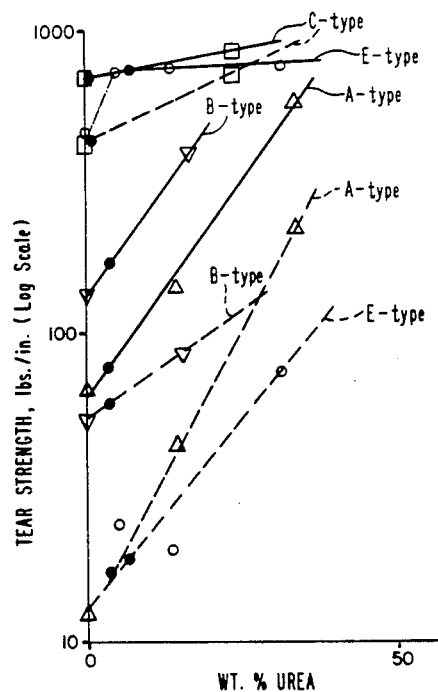
**21 Claims, 6 Drawing Sheets**

**WATER CONTENT OF HYDRATED POLYMERS**  
vs.  
**PERCENT OF UREA MODIFICATION**



SOLID LINE = DRY POLYMER  
DASHED LINE = HYDRATED POLYMER

**TEAR RESISTANCE**  
vs.  
**PERCENT OF UREA MODIFICATION**



SOLID LINE = DRY POLYMER  
DASHED LINE = HYDRATED POLYMER